DENSO
DENSO WAVE

Reading and Image Generation of
QR Code and Bar Codes

QRdeCODE

User's Manual

(ver.1.4.0)

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1. General

QRdeCODE is an application designed for iPhone, capable of reading both QR Code and bar codes as well as generating QR Code images.

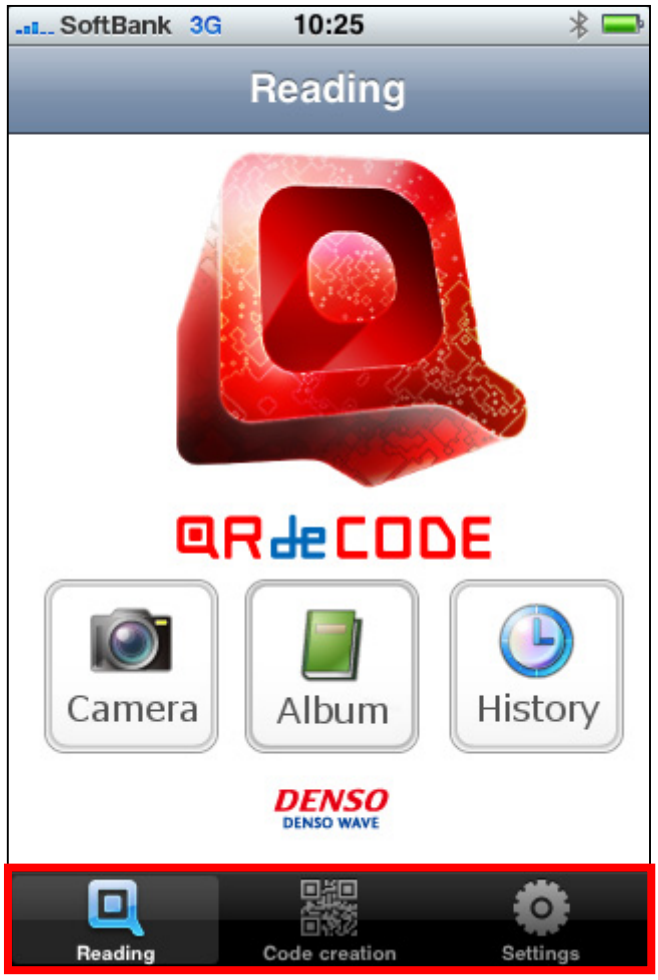
With QRdeCODE, you can easily gain access to the web site just by reading a QR Code. Encoding the contact information saved in your iPhone into a QR Code is also possible.

2. Operating Environments

OS: iPhone OS ver. 4.0 or later
Model type: iPhone 3G and iPhone 3GS and iPhone4

3. Main Features

Three different functions including code reading, code generation and setting up the reading conditions are available. You can switch these functions with the three tabs at the bottom of the touchscreen.

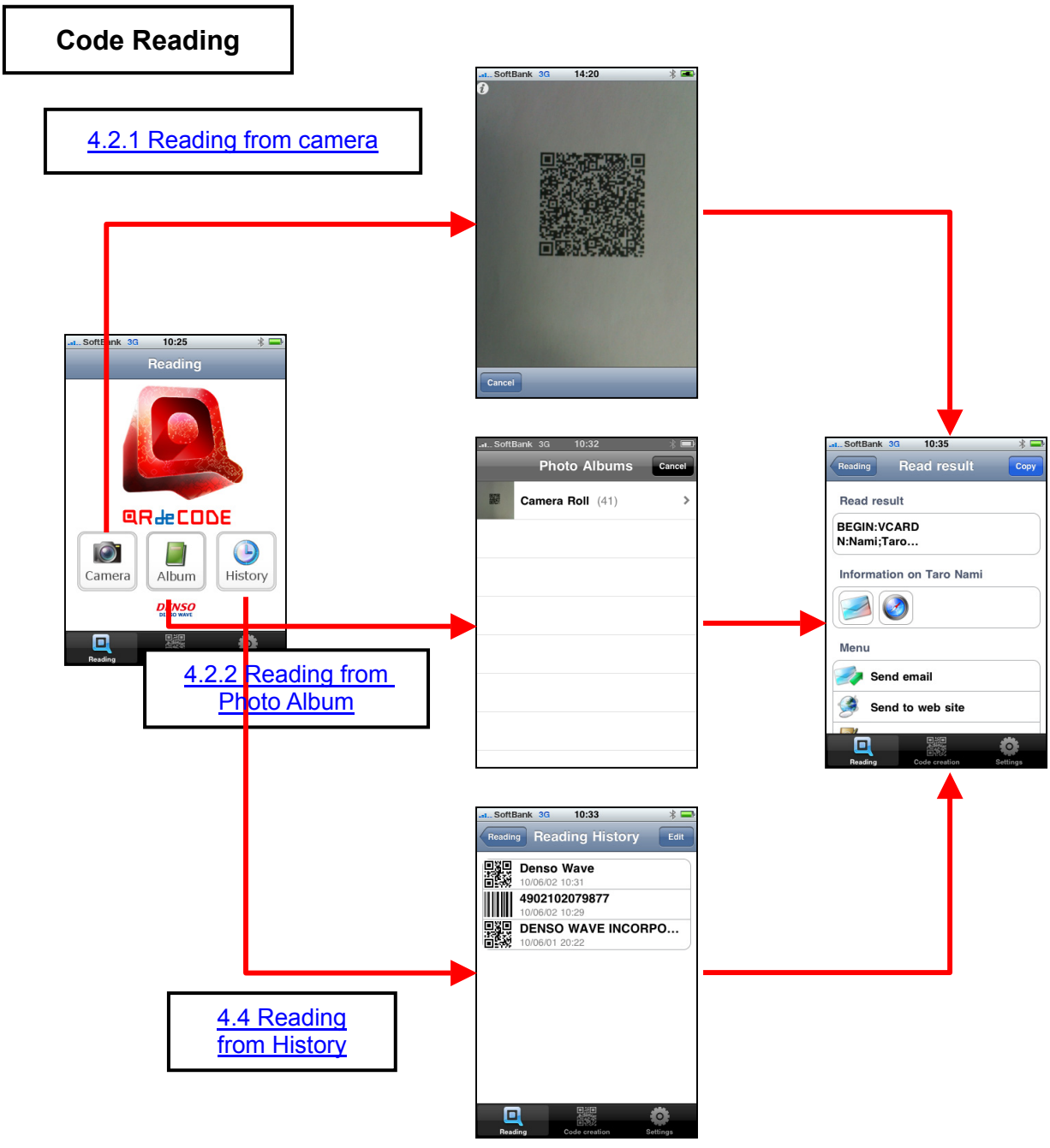


3.1 Available functions

1) Reading: An ability to read QR Code and some other bar codes.
2) Code generation: An ability to generate QR Code.
3) Setting up: An ability to set the code reading conditions.

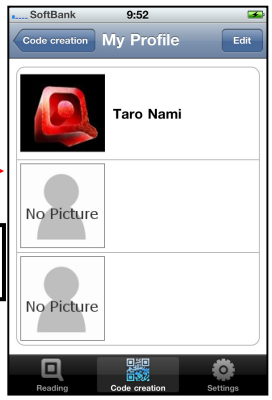
3.2 Flow of the touchscreen

The figures below show the flow of iPhone touchscreen.

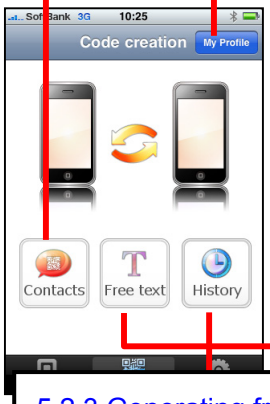


Code Generation

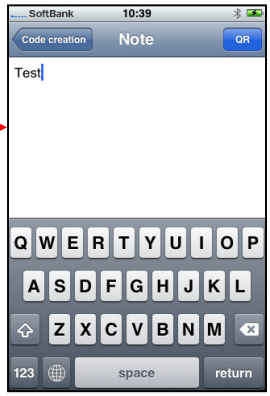
5.2.1 Generating from My Profile



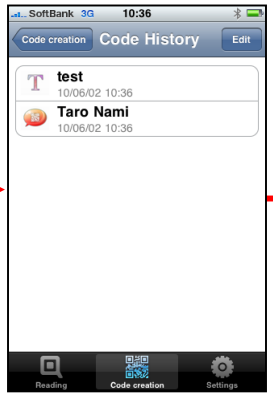
5.2.2 Generating from Contacts



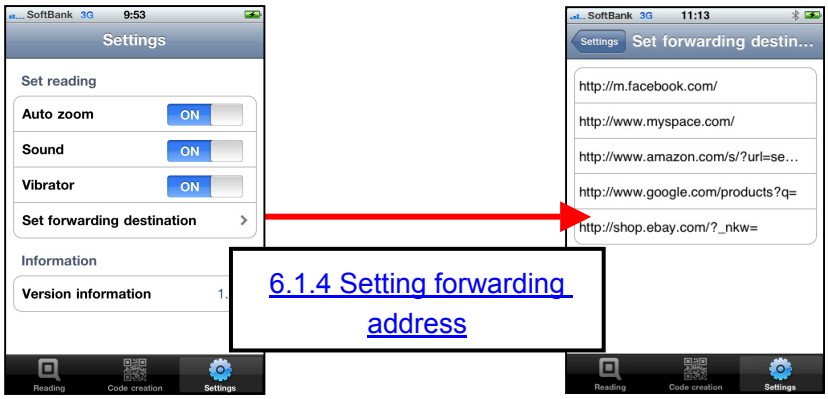
5.2.3 Generating from Note



5.3 Auto-save function of History



Setting Up



6.1.4 Setting forwarding address

4. Code Reading

4.1 Readable codes

In addition to QR Code, QRdeCODE can also read EAN-13, EAN-8, UPC-A and UPC-E codes. See the following tables for the specification of each code. In addition, even a code outside of these specifications may be readable depending on the condition of the label.

QR Code

Model	Applicable specifications		Remarks
	IPhone 3G	IPhone 3GS, iPhone4	
Model	Model 2		
Version	1 - 5	1 - 20	
Cell size	1.00 mm min.	0.30 mm min.	The smallest element of the code
Quiet zone	4 cells or more		A clear white area surrounding the code
Error correction level	L (7%), M (15%),Q (25%) and H (30%)		An ability to resore the data in a soiled or damaged code
Sturucured append code	Supported		
Reference standard	ISO/IEC 18004		

EAN-13

Item	Applicable specifications		Remarks
	IPhone 3G	IPhone 3GS, iPhone4	
No. of readable digits	13 digits		
Module size	-	0.26 mm - 0.66 mm	
Magnification ratio	-	0.8 - 2.0	0.33 mm bar defined by EAN SYMBOL SPECIFICATION is taken as the standard
Left margin	11 modules or more		
Right margin	7 modules or more		
Check digits	MOD-10		

EAN-8

Item	Applicable specifications		Remarks
	IPhone 3G	IPhone 3GS, iPhone4	
No. of readable digits	8 digits		
Module size	-	0.26 mm - 0.66 mm	
Magnification ratio	-	0.8 - 2.0	0.33 mm bar defined by EAN SYMBOL SPECIFICATION is taken as the standard
Left margin	7 modules or more		
Right margin	7 modules or more		
Check digits	MOD-10		

UPC-A

Item	Applicable specifications		Remarks
	IPhone 3G	IPhone 3GS, iPhone4	
No. of readable digits	12 digits		
Module size	-	0.26 mm - 0.66 mm	
Magnification ratio	-	0.8 - 2.0	0.33 mm bar defined by EAN SYMBOL SPECIFICATION is taken as the standard
Left margin	9 modules or more		
Right margin	9 modules or more		
Check digits	MOD-10		

UPC-E

Item	Applicable specifications		Remarks
	IPhone 3G	IPhone 3GS, iPhone4	
No. of readable digits	7 digits		
Module size	-	0.26 mm - 0.66 mm	
Magnification ratio	-	0.8 - 2.0	0.33 mm bar defined by EAN SYMBOL SPECIFICATION is taken as the standard
Left margin	9 modules or more		
Right margin	7 modules or more		
Check digits	MOD-10		

4.2 How to read a code

Two ways of reading are available to you: One is to directly read an actual printed code using the iPhone camera and the other is to read a code image from your Photo Album.

4.2.1 Reading from camera

Tap the [Camera] icon on the touchscreen to start the camera.

Hover iPhone above the code. Reading starts automatically when the code falls within the camera's field of view. On completion of the reading, QRdeCODE proceeds to the next screen and displays the read result. You will not see any error message even if QRdeCODE was unable to read the code.

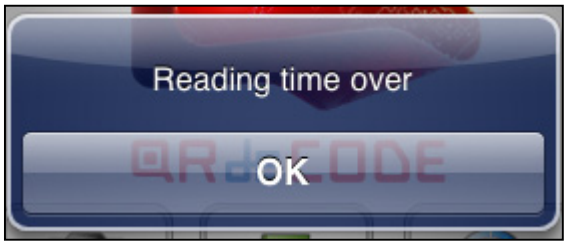
Tap "ⓘ"at the upper left of the screen for a tip on code reading.

Tip
You should keep QR Code from 5 cm to 10 cm away from iPhone to properly read and display it within the touchscreen. Touch the touchscreen if the QR Code is not focused.
OK

A dedicated auto focus function is provided for iPhone 3GS , iPhone4 only.

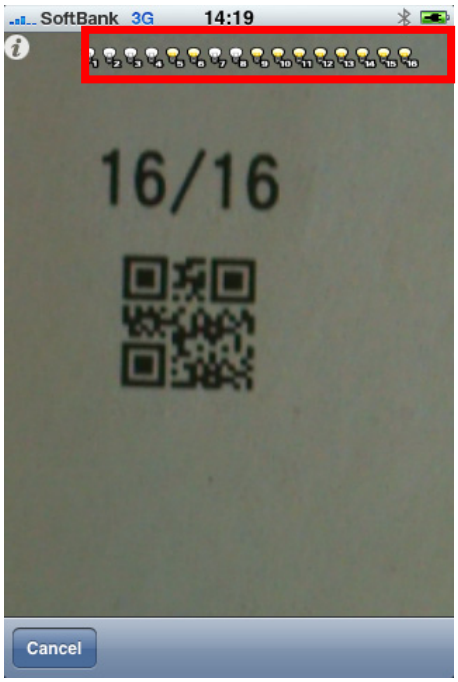
Use the [Cancel] button if you want to go back to the previous screen.

If QRdeCODE cannot detect and read the code within a one-minute time, the following timeout error message appears and QRdeCODE stops reading.



QRdeCODE is featured with an ability to read a structured append QR Code consisting of multiple code blocks.

During the reading of this structured append QR Code, multiple lamps as shown in the figure below are displayed to tell you the progress of reading.



The “light ON” lamp indicates the code blocks that have been read so far, while “light OFF” lamp shows those that are not read yet.

Light ON

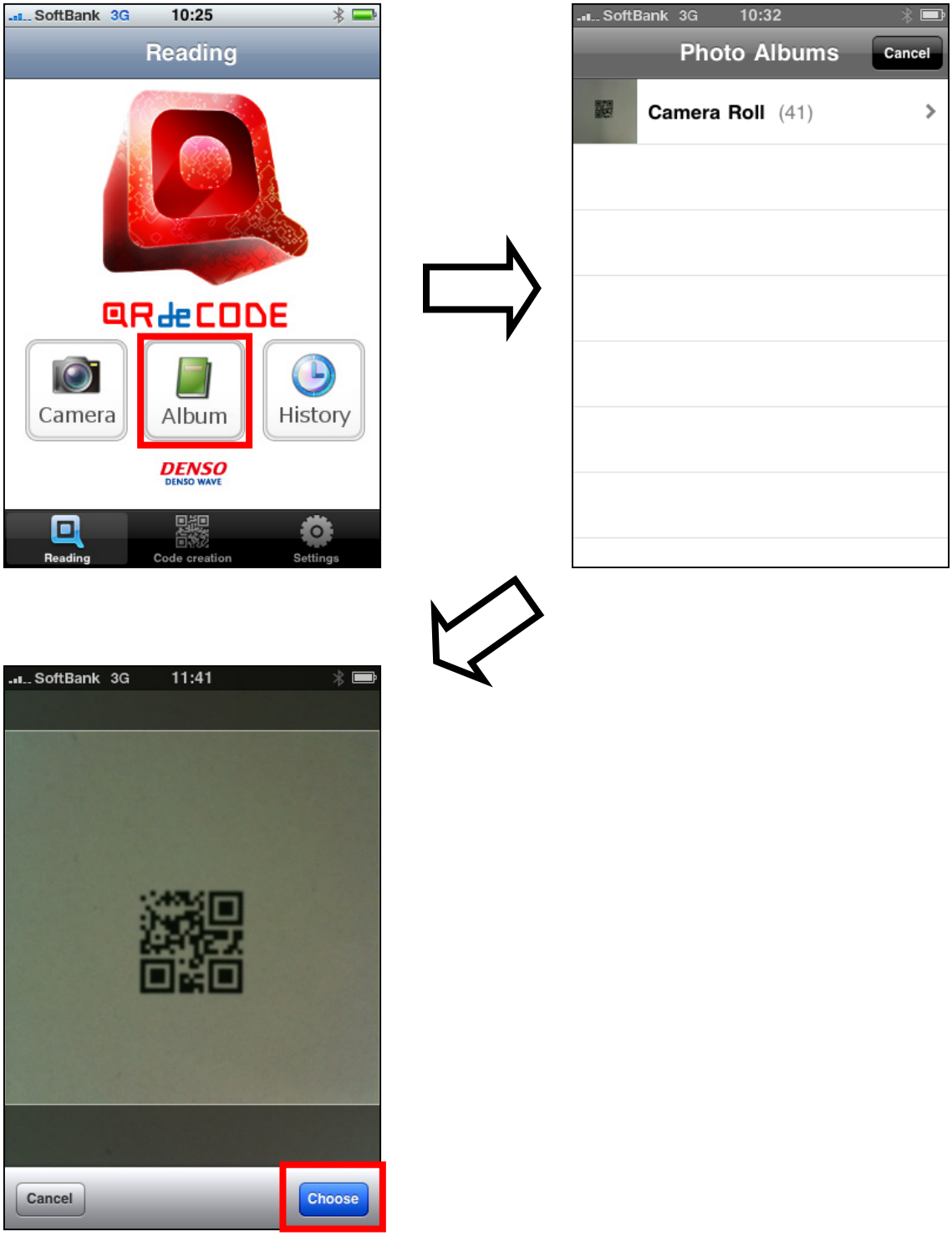
Light OFF

The reading completes when all the code blocks are properly read. However, QRdeCODE determines the reading was not successful and thus clears the read data if:

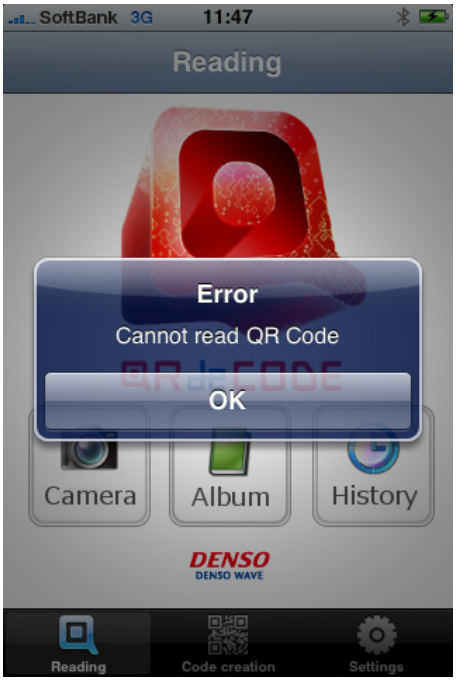
1) The reading was started with the [Camera] icon;
2) The [Cancel] button was selected during the reading;
3) A code other than a structured append code was read; or
4) The reading did not complete within the specified time duration (timeout).

4.2.2 Reading from Photo Album

Tap the [Album] icon to turn on the Photo Album. A reading starts automatically once you select the photo image you want to read. On completion of the reading, QRdeCODE proceeds to the next screen and displays the read result. Use a Jpeg image of up to 2048 X 1536 mm in size.



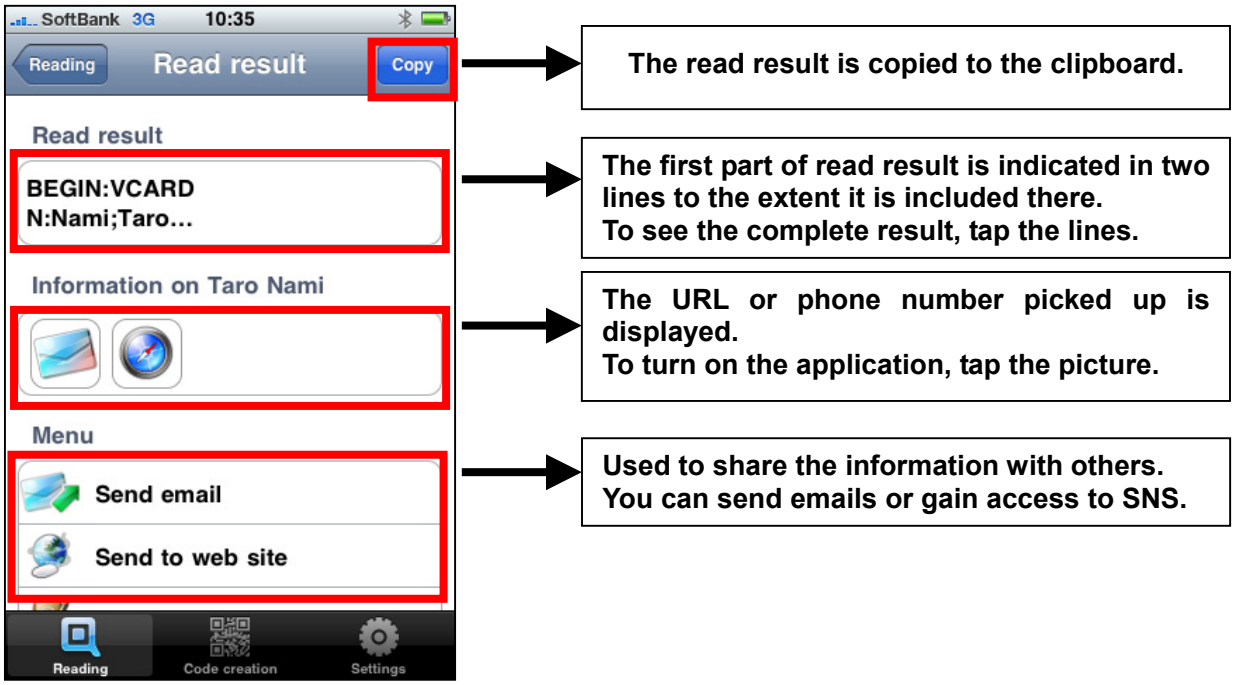
The following error message appears if the reading was not successful.



Please be noted that this reading method from the Photo Album is not applicable to structured append QR Code.

4.3 Read result

The read result is indicated in the three main blocks of the result indication block, pick up information block and menu block. A character string is encoded in Shift_JIS Code.

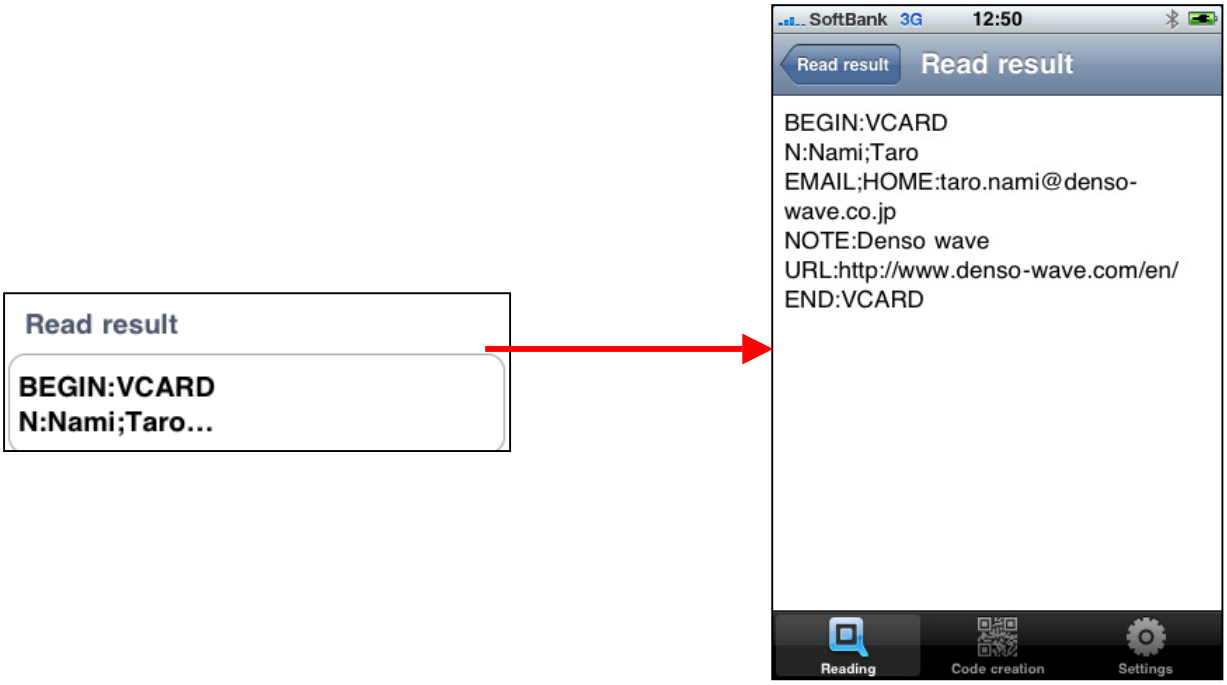

SoftBank 3G 10:35
Reading
Read result
Copy
Read result
BEGIN:VCARD
N:Nami;Taro...
Information on Taro Nami
Menu
Send email
Send to web site
Reading
Code creation
Settings
The read result is copied to the clipboard.
The first part of read result is indicated in two lines to the extent it is included there.
To see the complete result, tap the lines.
The URL or phone number picked up is displayed.
To turn on the application, tap the picture.
Used to share the information with others.
You can send emails or gain access to SNS.

If any character in the range from “0x00 to 0x1F”, “0x7F to 0xA0” or “0xE0 to 0xFF” as defined in the ASCII Code Table is included in the read result, that character is eliminated from the result. However, this does not apply to two-byte *Kanji* Shift_JIS characters in JIS X 0208.

In this case, a character “¥(0x5C)” is represented in a backslash symbol.

4.3.1 Read result indication

Tap the block of the read result on the screen and you will see it in full-screen.



4.3.2 Picked up information

Tap the picked up icon and its corresponding application is activated.

You can make a search from a phone call or SMS transmission if the picked up information is a phone number or an email transmission if the information is an email address. Searching with a browser display is also possible if the information is a URL or with a Google map if the information is a physical location address.

The picked up information is registered in a vCard format as defined in RFC 2426. See the table below.

Item	vCard
Name	Yes
Phone number	Yes
Email address	Yes
Location address	Yes
Note	Yes
URL	Yes
Company name	Yes

If a format other than this vCard format is used, QRdeCODE will pick up a URL, email address or phone number according to the following rule.

Item	Rule
URL	An array of ASCII alphanumeric characters starting with either http:// or https:// and ending with “0x21-0x7E”. However, ”;(0x3B)” and ”,(0x2C)” are excluded. A URL starting with “www” is interpreted with an additional http:// header at the start of the character string.
Email address	An array of ASCII alphanumeric characters “0x21-0x7E”, in which an at-mark sign “@” is included followed by a character string ”.(0x2E)” for domain use. However, ”:(0x3A)”, ”;(0x3B)”, ”, (0x2C)” and ”/(0x2F)” are excluded.
Phone number	An array of numeric characters “0x30-0x39” or ”()-“. The number of characters shall be from 8 to 24.

For uniquely assigned profile items, such as a personal or company name that is registered only once, the very first one that was picked up at the beginning only is accepted. If the item is something like an email address that can be registered several times, QRdeCODE will pick up 10 such items at a maximum.

4.3.3 Menu function

You can choose from the “Send email”, “Send to web site” and “Register new contact” menus (“Register new contact” is not usually displayed on the screen).

Use “Send email” if you want to send the read result in a text format. The read result is transmitted to the web site assigned in “Set forwarding destination” (see Section 6.1.4). This function is useful when posting the read result or searching the information you are looking for.

The read data is first copied to the clipboard before it is transmitted to the web site if “Move with copy” is selected, while it is directly transmitted without its copy if “Move without copy” is selected. If you use “Add read result and move”, the read result is first added to the URL assigned in the “Send to web site” and then transmitted to that web site.

If the code was properly read in the right format, the “Register new contact” screen appears. You can add the name and/or phone number on this screen.

4.4 History function

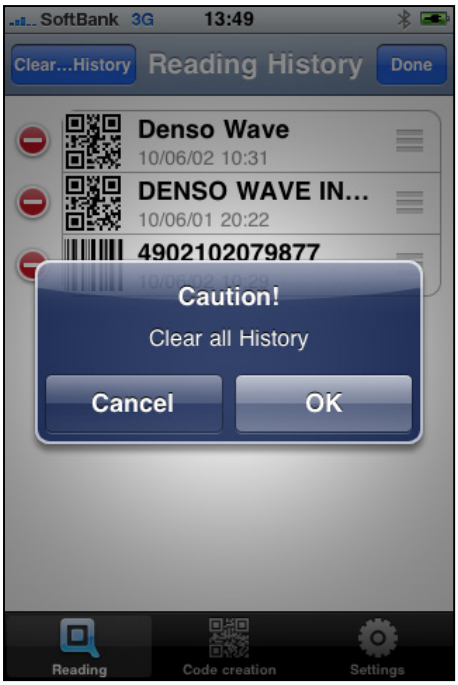
You can review and check the history of the codes you have read so far. Tap the character line in the table and you will see a list of the records on the read results as shown below.

You can save up to 20 records. If the number of records exceeds 20, the saved records are automatically cleared from the History starting from the oldest one.

You can clear the records of history or reshuffle the priorities with the [Edit] button at the upper right of the touchscreen. Tap the button to the left of the table and the [Clear all History] button appears. Use this button to clear the records from the History.

You can reshuffle the priorities by scrolling up or down the cell while touching the upper left button.

Tap the [Clear all History] button and you will see the following warning message. Select “OK” if you want to clear the records from the History



5. Code Generation

5.1 Type of code you can generate

The code you can generate is QR Code Model 2 with the error correction level M only.

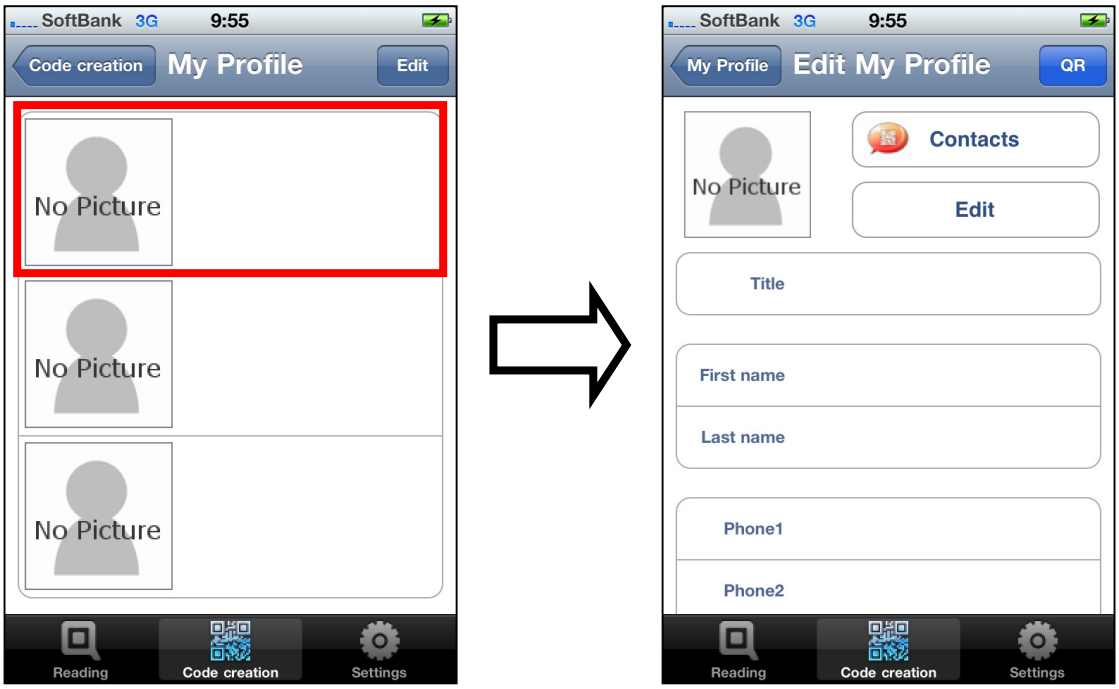
In the code generation, the smallest code version, with four-cell quiet zones arranged around the code, just enough to hold the entire length of character string, is automatically selected (ver. 20 max.). The code is always displayed in its largest possible size, with ten cells at maximum and two cells at minimum.

5.2 How to generate a code

There are three ways to make a QR Code. You can make a code from your My Profile list, from your Contacts list, or from a text you have entered using the keypad.

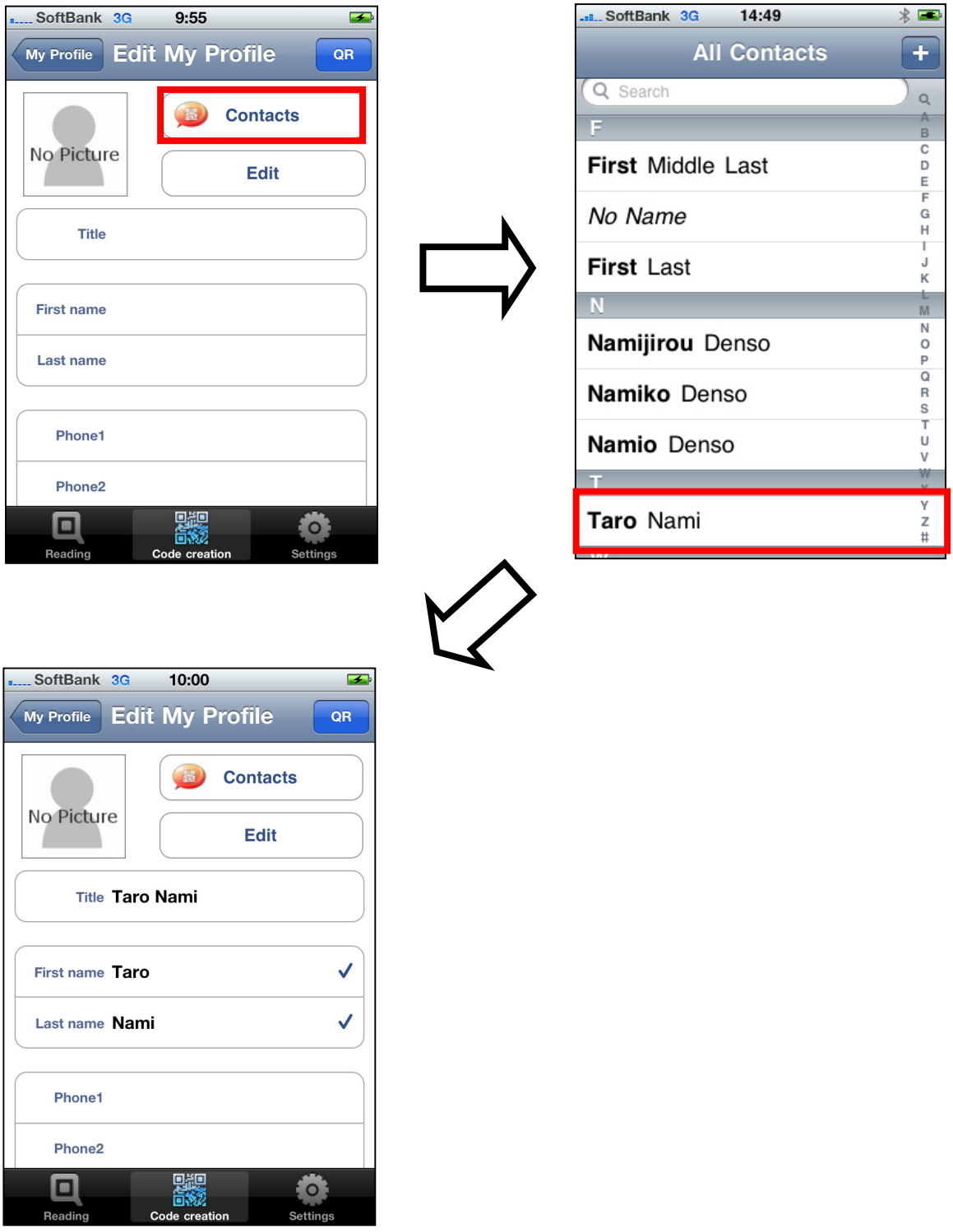
5.2.1 Generating from My Profile

Tap the [My Profile] button to see the screen for profile selection. You can register up to three profile items on this screen. Any unused cells are left blank. If you want to register a new contact, tap a blank cell. The My Profile Edit screen appears for you to edit the contents.



You can register your profile by reading it from your Contacts or by directly entering the details of profile, such as your name or address, in the cell from the keypad.

Tap [Contacts] and you will see a list of all the contact information saved in your iPhone. Select the one you want to encode from this list and its detailed profile is automatically picked up in each of the cells.

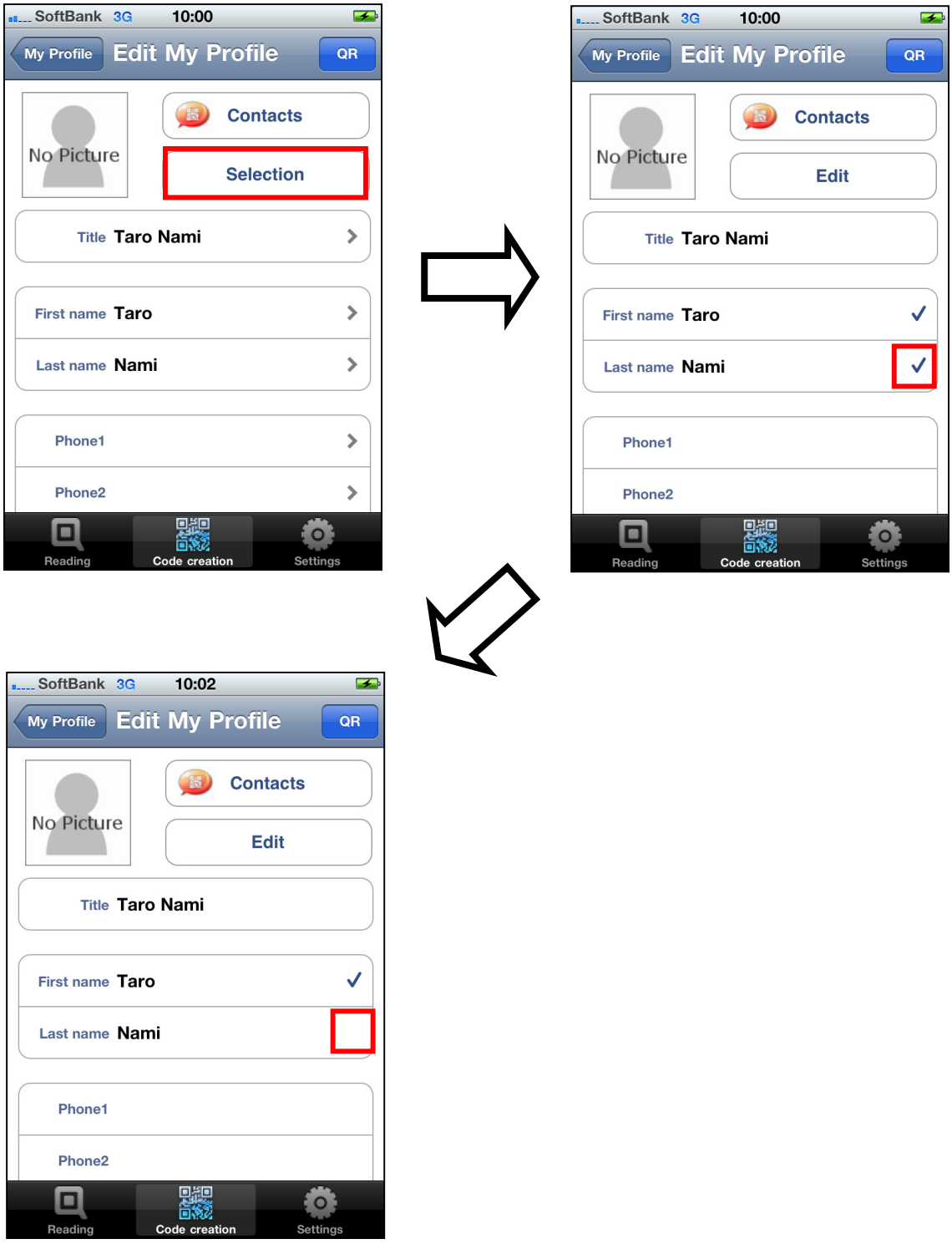


The button below [Contacts] is toggled between [Edit] and [Select] whenever it is tapped. Tap [Edit] and the button "＞" appears to the right of each cell. To edit the contents of the profile information you want, first tap this button and then tap the cell containing that title on the screen that follows. This will take you to the next screen where you can edit the profile.

After you have finished the editing work, tap [Complete] and the edited results are reflected on the screen.

When you tap [Select], it is changed to [Edit] on the next screen and the button “>” disappears. On this screen, check-mark the items of profile you want to encode (such as the first name, last name, etc).

.



When this editing work is complete, tap the [QR] button at the upper right of the screen. The entered information is automatically encoded in a QR Code based on the created profile.

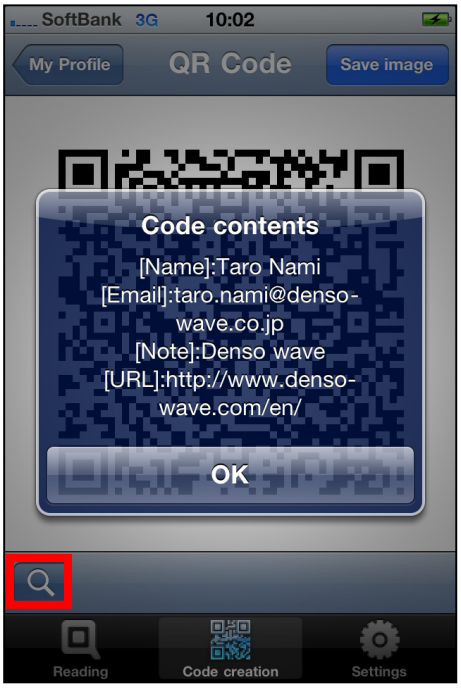
The format of contacts used in QRdeCODE complies with iPhone.
vCard conforming to the RFC 2426 format is adopted for an iPhone format.
The QR Code reading specification Version 2.0 complies with the specification of SoftBank.
Information you can encode in QR Code is different for each format.

Item	vCard
Name	Yes
Phone No.	Yes
Email address	Yes
Address	Yes
Note	Yes
URL	Yes
Company name	Yes

If you want to exchange your information with others, add your information to your Contacts list.
In QR coding, all the characters are encoded in Shift_JIS Code.

Please note that a character string not supported by Shift_JIS Code is first converted into a question mark “?” before it is encoded in a QR Code.

You can save a QR Code in your Photo Album by tapping the [Save image] button at the upper right when creating the code. If you want to check the encoded information, use the search button “Q“ at the bottom of the screen.



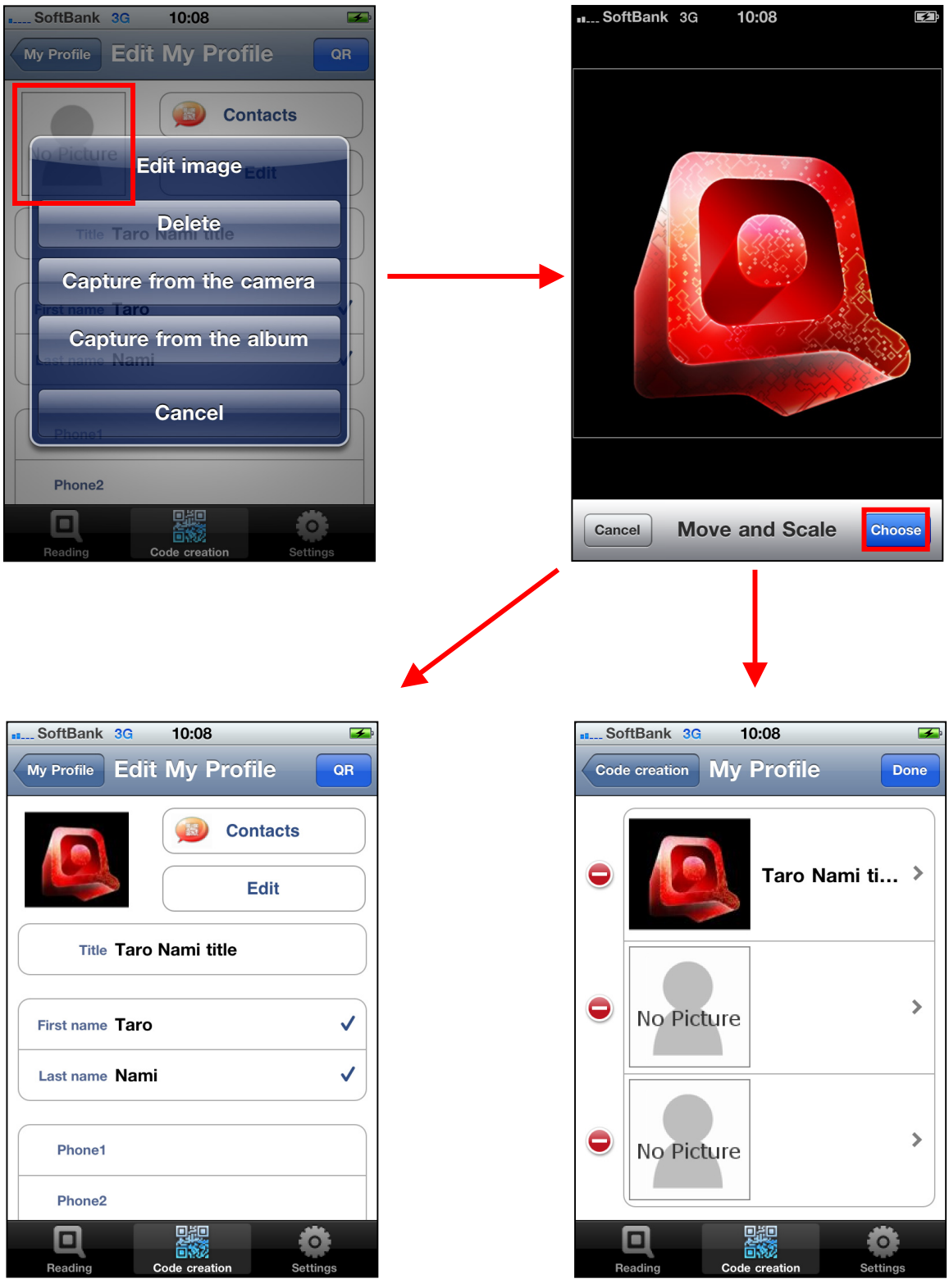
The title of the profile registered in your My Profile list is indicated on the screen for profile selection. At this time, the profile that has its name is shown with a name, while the one that does not is shown with “No Title”. No title is QR-coded.

When you tap the name in the cell, QRdeCODE starts generating a QR Code from the profile.

If you want to edit or clear the information in the cell, touch the [Edit] button at the top right of the screen. Use the button “>“ to the right of each cell if you want to view the Edit screen. Or, use the button “⊖” to the left if you want to clear the information.

SoftBank 3G 10:07
Code creation
My Profile
Edit
No Picture
Taro Nami title
No Picture
No Picture
Reading
Code creation
Settings
SoftBank 3G 9:52
My Profile
QR Code
Save image
Reading
Code creation
Settings
SoftBank 3G 10:08
Code creation
My Profile
Done
No Picture
Taro Nami ti..
No Picture
No Picture
Reading
Code creation
Settings
SoftBank 3G 10:08
My Profile
Edit My Profile
QR
No Picture
Contacts
Edit
Title Taro Nami title
First name Taro
Last name Nami
Phone1
Phone2
Reading
Code creation
Settings

You can edit and display the images taken from the camera or those already saved in your Photo Album as the images of the profile information saved in your My Profile list. Select “Capture from the camera” or “Capture from the album” on the “Edit My Profile” screen. However, the image is not encoded.



5.2.2 Generating from Contacts

Tap [Contacts] on the code generation screen and you will see a list of all the contacts saved in iPhone. Select the one you want to encode from this list and its detailed profile is automatically picked up in each of the cells.

Check the items of profile you want to encode and then tap the [QR] button. The checked item is encoded in a QR Code. The items checked here are saved and used for the initial setting.

5.2.3 Generating from Note

Tap [Free text] on the code generation screen to move to the next screen. On this screen, enter a text using the keypad and then tap the [QR] button. The entered text is encoded in a QR Code.

Please not that a character string not supported by Shift_JIS Code is first converted into a question mark “?” before it is encoded in a QR Code.

5.3 Auto-save function of History

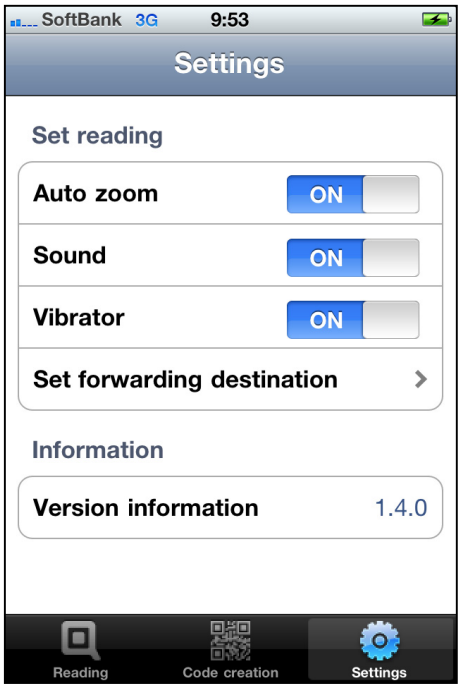
You can review the records of the codes so far created in QRdeCODE just by tapping the cell in the table. Any code that was not properly created is not saved in the History.

You can save up to 20 records. If the number of records exceeds 20, the saved records are automatically cleared from the History starting from the oldest one.

To clear the records or reshuffle the priorities, use the [Edit] button at the upper right of the touchscreen (see Section 4.4).

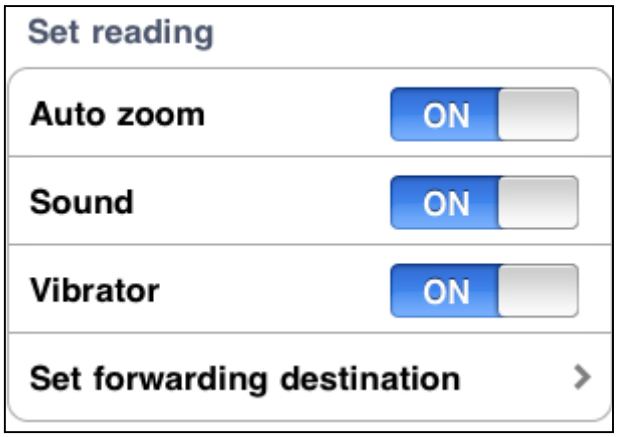
6. Set Up Functions

Use the set up functions when setting and saving the reading conditions. The settings set with this function are retained even after QRdeCODE is turned off.



6.1 Setting reading conditions

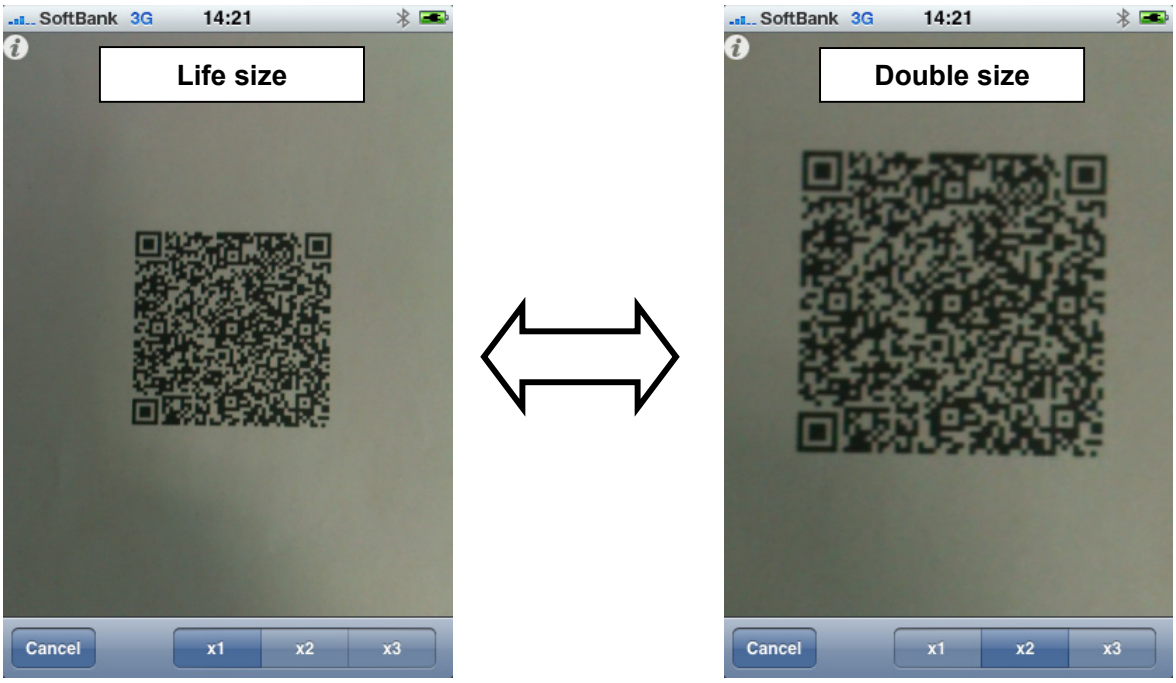
Whether or not QRdeCODE automatically zoom in/out, sound or vibrate during the reading is selectable. You can also set where to send the read result.



6.1.1 Auto-zoom

An auto-zoom function is provided for easier and quick reading. With this function enabled, the target code is automatically searched and enlarged for you to read it without effort.

If this auto-zoom is off, the magnification button is displayed at the lower right of the screen. You can select the magnification of code image from the three options of “Life size”, “Double size” or “Triple size”.



6.1.2 Sound

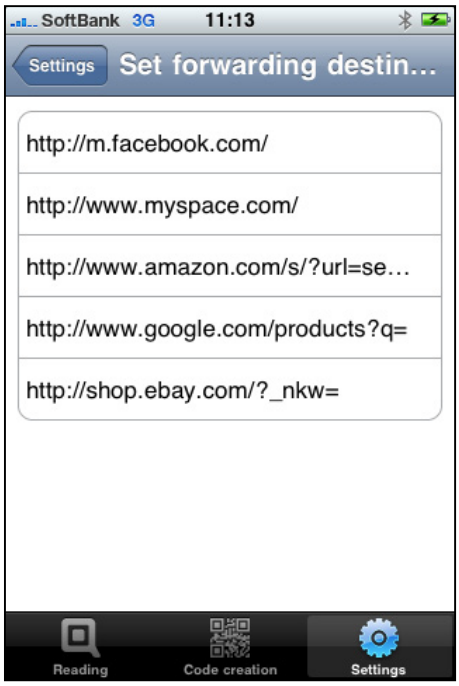
You can choose whether or not QRdeCODE to sound at the end of the reading.

6.1.3 Vibrator

You can choose whether or not QRdeCODE to vibrate at the end of the reading.

6.1.4 Set forwarding destination

Sending the read result to your favourite web site is possible. You can save up to five web sites in QRdeCODE.



6.2 Version information

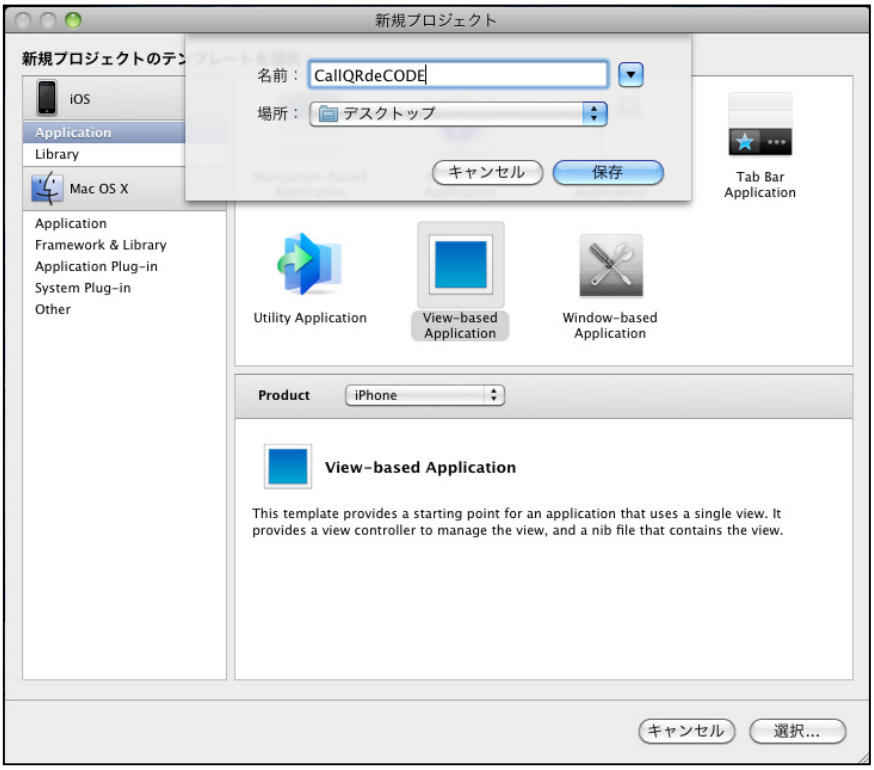
The current version of your application is described as below.

7. Features for the Experienced

The URL scheme is newly supported from ver.1.4.0.

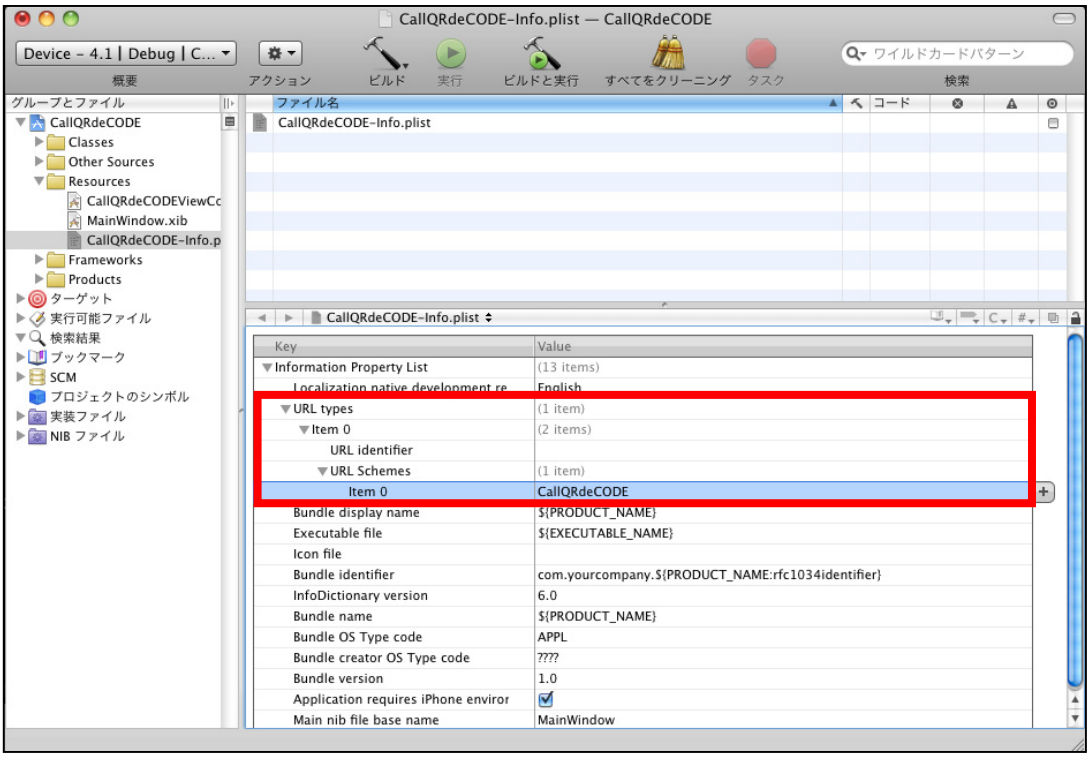
7.1 Calling QRdeCODE

This example shows how to start QRdeCODE with the UIButton in a View-based Application.



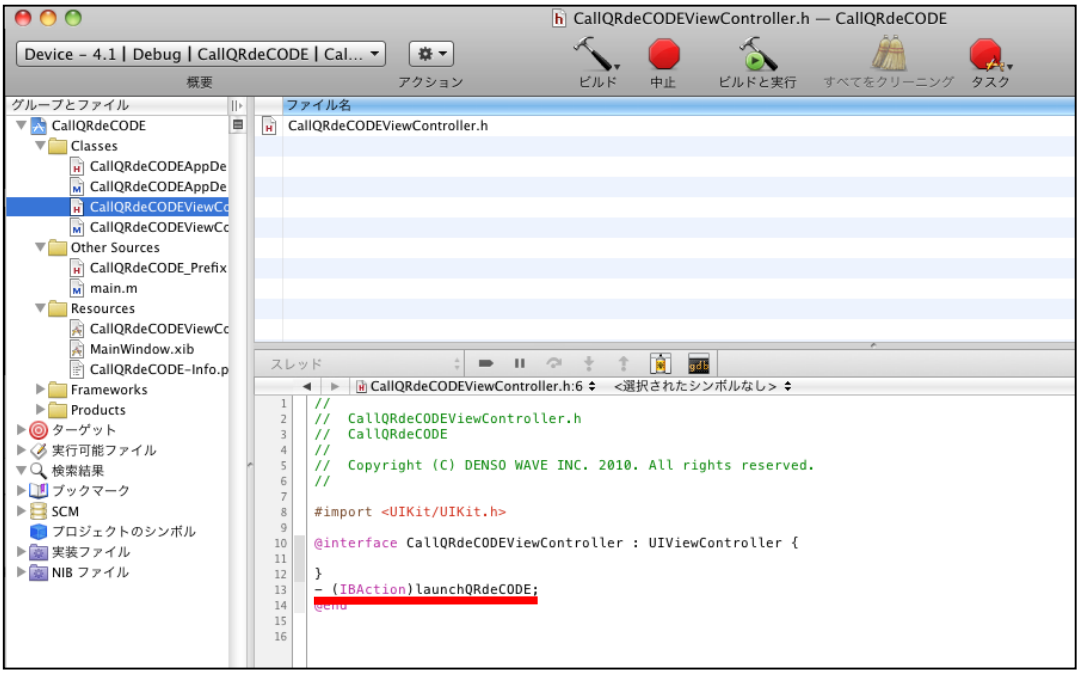
Step 1

Add a new item “URL Schemes” to the URL types and enter the URL scheme name of the application.



Step 2

Add "*- (IBAction)launchQRdeCODE;*" to the ViewController header file.

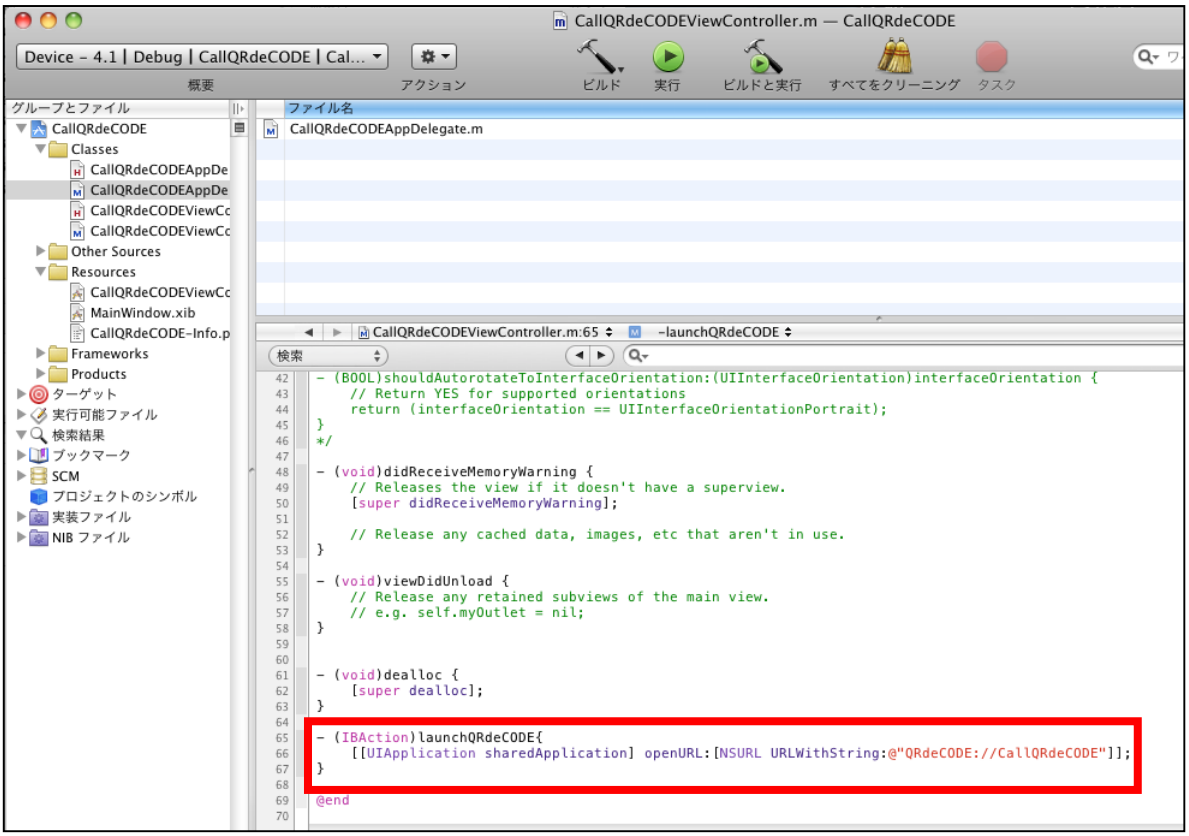


Step 3

Add the following code to describe the action of "*launchQRdeCODE*" to the source file.

```
- (IBAction)launchQRdeCODE{
        [[UIApplication sharedApplication] openURL:[NSURL
                                    URLWithString:@"QRdeCODE://CallQRdeCODE"]];
}
```

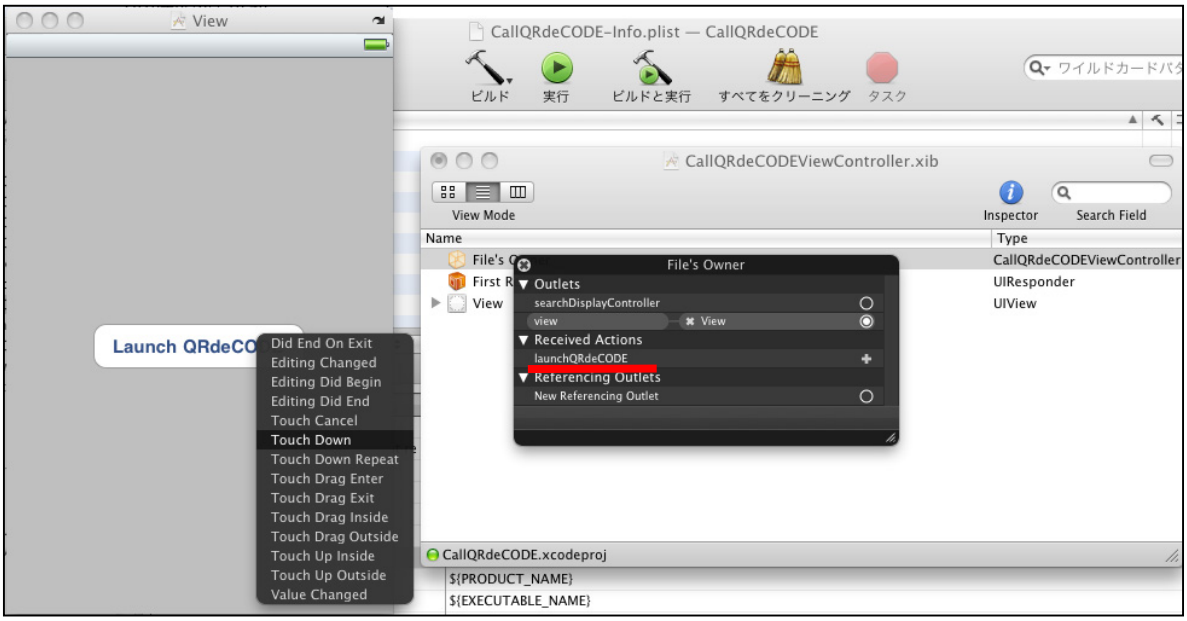
If you want to see the read result of QRdeCODE in the application you have called, you should partly rewrite this program from "*QRdeCODE://*" to "*QRdeCODE://[URL scheme of caller*". QRdeCode will then return "*[URL scheme of caller] ://[Read result]*" to that application on completion of the reading.



Step 4

Make a UIButton on the view canvas and assign it to the IBAction you have created.

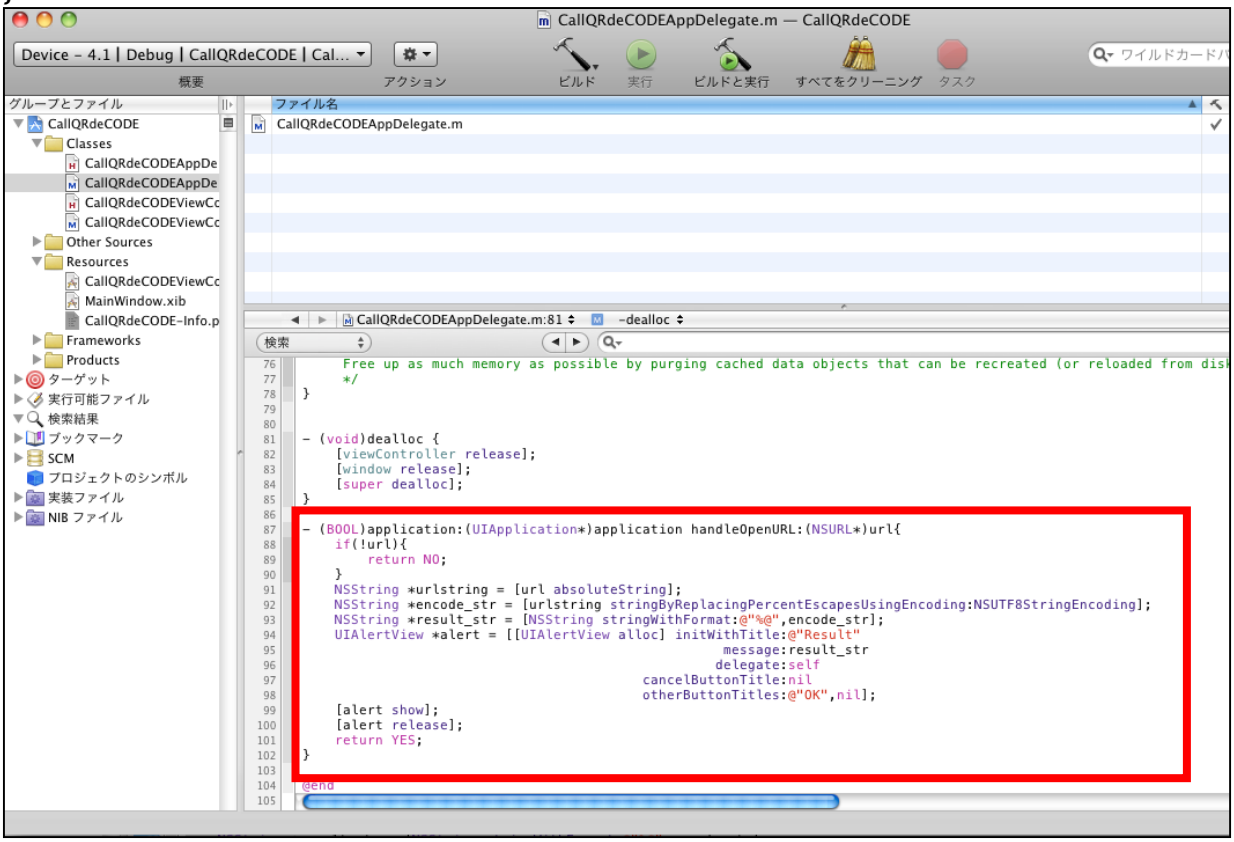
Tap this UIButton to call QRdeCODE.



Step 5

Add the code below to the Delegate file. This allows the read result to be displayed in the opened application.

```
- (BOOL)application:(UIApplication*)application handleOpenURL:(NSURL*)url{
        if(!url){
                return NO;
        }
        NSString *urlstring = [url absoluteString];
        NSString *encode_str = [urlstring
                stringByReplacingPercentEscapesUsingEncoding:NSUTF8StringEncoding];
        NSString *result_str = [NSString stringWithFormat:@"%@",encode_str];
        UIAlertView *alert = [[UIAlertView alloc] initWithTitle:@"Result"
                                        message:result_str
                                        delegate:self
                                        cancelButtonTitle:nil
                                        otherButtonTitles:@"OK",nil];
        [alert show];
        [alert release];
        return YES;
}
```



Step 6

Provided here is an actual example showing how to start the sample application.

Tap the “Launch QRdeCODE” button to start QRdeCODE. At this time, it is important that QRdeCODE already be installed in your iPhone. If succeeded in reading the code, QRdeCODE returns the read result to the sample application. However, if there is an error in the URL scheme of the caller, the read result is sent back to QRdeCODE, not to the sample application, as this is recognized as the normal mode.

To those using this sample program

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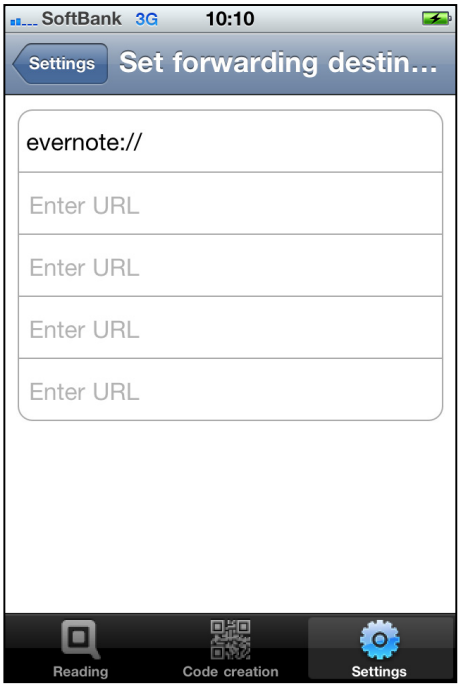
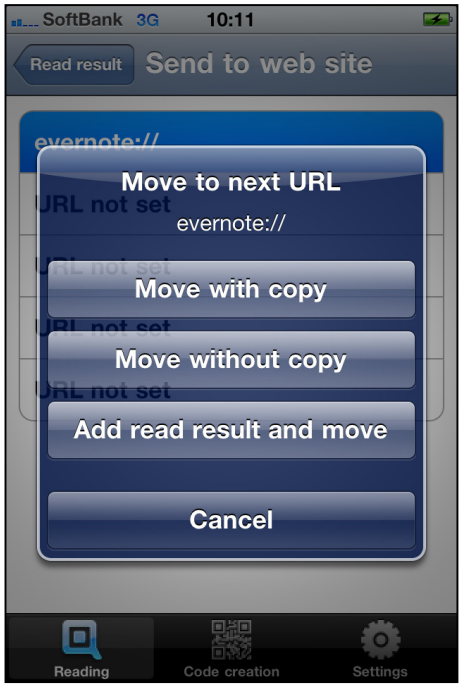
7.2 Calling from QRdeCODE

QRdeCODE is also equipped with an ability to call another application. To enable this feature, you need to previously enter the target URL scheme you want to call when setting its destination. This allows QRdeCODE to copy the read result and invoke the intended application.





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Revision History

Date	Ver.	Remarks
April 1, 2010	1.0	First issued.
April 22, 2010	1.1	My Profile function was added. A function to edit the Code History was added.
June 1, 2010	1.2	A function to add the read result and move it to the web site was added.
August 4, 2010	1.3	Updated to support iOS4.
September 20, 2010	1.4	Feature of My Profile was extended. URL scheme was newly supported.

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